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Claims

[c1] We claim:

1. In a brake booster having a first shell that is joined to a second shell to create a housing with an interior cavity that is divided by a movable wall into a first chamber and a second chamber, said first chamber being connected to receive fluid having a first pressure while said second chamber is selectively connected to receive fluid having the first pressure and a second pressure as a function of an input force applied to a valve to create a pressure differential across the movable wall and develop an output force for effecting a brake application, said movable wall being characterized by a diaphragm, a backing plate and a hub member, said diaphragm having a disc with an peripheral and an axial bead, said peripheral bead being retained between said first and second shells while said axial is located in a groove in a cylindrical body of said hub member, said groove having a front face separated from a rear face with an arcuate transition surface located between a bottom of said groove and said front face, said axial bead having a profile corresponding to said groove and an arcuate lip that extends from a rear surface, said lip being connected by a convolute to a ra-

dial section of said disc, said backing plate having a profile that essentially corresponds to said disc of said diaphragm with a radial annular surface that engages said front face of said groove, said axial bead engaging said backing plate to urge said radial annular surface into engagement with said front face of said groove to separate said front chamber from said rear chamber, said convolute allowing said movable wall to move in response to an input force being applied to said valve without creating a radial force in said diaphragm that may cause said axial bead to move out of contact with the bottom of said groove.

[c2] 2 The tandem brake booster as recited in claim 1 wherein said axial bead is further characterized by a ledge for receiving an axial face of said radial annular surface of said backing plate, said ledge having a radial face that engages said radial annular surface of said backing plate to urge said backing plate into engagement with said front face of said groove.

[c3] 3. The tandem brake booster as recited in claim 2 wherein said axial bead is further characterized by a ramp that extends from said lip toward said ledge, said ramp providing a resilient force for urging said radial annular surface into engagement with said front face of said groove.

[c4] 4. The tandem brake booster as recited in claim 3 wherein said flange of said hub is further characterized by an annular indentation through which a peripheral surface thereof is connected to the front face on said groove.

[c5] 5. The tandem brake booster as recited in claim 4 wherein said backing plate is characterized by an annular projection that is adjacent said radial annular surface, said annular projection being received by said annular indentation to align said radial annular surface within said groove.

[c6] 6. The tandem brake booster as recited in claim 5 wherein said axial surface of said radial annular surface engages said ledge to prevent radial movement of said axial bead with respect to said groove.

[c7] 7. The tandem brake booster as recited in claim 6 wherein said convolute of said disc is substantially parallel with said ramp on said axial bead.

[c8] 8. A process for attaching a diaphragm and backing plate to a hub to define a movable wall of a brake booster comprising the steps of:

obtaining a hub from a source, said hub being defined by a cylindrical body with a flange that is sepa-

rated from an annular rib wherein said flange forms a front face and said annular rib forms a rear face of a groove, said flange having a first peripheral surface at a first height and rib having a second peripheral surface at a second height from a peripheral surface of said cylindrical body, said peripheral surface of said cylindrical body having an arcuate surface that transitions a bottom of said groove into said front face;

placing said hub on a first fixture;

obtaining a backing plate from a source, said backing plate being defined by a disc having an axial opening that is surrounded by a radial surface;

placing said backing plate on said cylindrical body with said radial surface engaging said front face to center said axial opening within said groove of said cylindrical body;

placing a second fixture on said peripheral surface of said cylindrical body, said second fixture being defined by a first sleeve with a first end that engages said rib and a second end, said first sleeve having a first diameter surface corresponding to said second height of said rib that extends from said first end to a shoulder of a smaller second diameter surface and a smaller third diameter surface that extends from said second end to a ramp that connects said third

diameter surface with said second diameter surface, said sleeve having a arcuate surface that transitions from said second diameter surface into said shoulder;

obtaining a diaphragm from a source, said diaphragm being defined by a disc with an peripheral bead and an axial bead with said axial bead including a convolute that extends from a lip on a rear face, said axial bead having an inner peripheral face with a cylindrical section that extends from said rear face through an arcuate section to a front face that is parallel to said rear face;

placing said axial bead of said diaphragm on said second diameter of said sleeve with said front face engaging said shoulder;

bringing a third fixture into alignment with said second fixture, said third fixture including a plurality of legs that engage said third diameter of said sleeve;

moving said third fixture toward said first fixture such that said legs progressively pivot while engaging said third diameter, said ramp, said second diameter and ultimately cause said axial bead to rotate and move said rear face onto said plurality of legs when said plurality of legs have pivoted to an axial position with respect to the axis of said second fixture;

moving a fourth fixture toward said toward said third fixture, said fourth fixture being defined by a second sleeve with a third face on a first end, said third face having an annular apex that extends from an outer peripheral surface toward and inner peripheral surface;

moving said second sleeve into engagement with said axial bead to slide said rear face off said plurality of legs and onto said first sleeve; moving said second sleeve to slide said axial bead toward said first fixture with said rear face passing over said rib on said cylindrical member and tilting toward said groove; and

continuing to moves said second sleeve toward said first fixture with said third face engaging said convolute to compact said axial bead into said groove such that said inner peripheral surface of said axial bead engages said groove to form a sealed surface between said front face and rear face of said groove.

[c9] 9. The process as recited in claim 8 wherein said axial bead is further characterized by a ledge formed on said front face, said fourth fixture axially moving toward said first fixture to radially compressing said axially bead such that said ledge moves past said axial opening in said disc of said backing plate while said radial surface

assists in confining said axial bead with respect to said groove on return of said fourth fixture to a position of rest.

[c10] 10. The process as recited in claim 9 wherein said backing plate is further characterized by an annular projection that mates with a corresponding an annular indentation in said flange to assist in axially locating said backing plate in said groove.

[c11] 11. The process as recited in claim 10 wherein said axial bead is further characterized by an annular ramp that extends from adjacent said rib toward a radial shoulder for said ledge, said annular ramp urging said radial surface on said disc into engagement with said flange.

[c12] 12. The process as recited in claim 11 wherein said convolute is substantially parallel with said ramp when said axial bead is compacted into said groove such that said diaphragm is concentric with said backing plate.

[c13] 13. The process as recited in claim 12 wherein said axial bead of said diaphragm is axially compressed between said front face and said rear face of said cylindrical body in the compaction of said axial bead in said groove and radial compressed by the confinement of ledge and inner peripheral surface to seal axial bead within said groove.

[c14] 14. The process as recited in claim 13 wherein said convolute allows hub, backing plate and diaphragm to be moved without placing an a radial force on said diaphragm that would effect said seal between said axial bead and said groove.